Practical Work in Image Processing

1 Task 1: Image Binarization

In Task 1, you should write and submit a program that binarizes an image. It should meet the following requirements:

- 1.1 It performs the global adaptive thresholding described in the Lecture Notes in Image Processing (cf. Section 2.7.1). The input parameters are: input image and value ϵ .
- 1.2 It performs the local adaptive thresholding described in the Lecture Notes in Image Processing (cf. Section 2.7.2). The input parameters are: input image and the dimension of the local neighbourhood $W_w \times H_w$.

You should write and submit a report on your program (cf. Section 4).

2 Task 2: Histogram of Oriented Gradients

In Task 2, you should write and submit a program that meets the following requirements:

- 2.1 It computes a histogram of oriented gradients for a given image. The input parameters are: grayscale image, number of chaincode directions, and grid dimension.
- 2.1 It estimates the similarity between two input images by calculating the cosine similarity between their histograms of oriented gradients.

You should write and submit a report on your program (cf. Section 4).

3 Task 3: Object Detection

In Task 3, you should write and submit a program that meets the following requirements:

3.1 It reads an object represented in $image_A$ and detects its occurrences in $image_B$, by applying the sliding window technique. The input parameters are: two grayscale images, number of chaincode directions, grid dimension, sliding window dimension, sliding window steps along the x- and y-axis, etc.

You should write and submit a report on your program (cf. Section 4).

4 Source Code and Written Report

You should submit your source code and written report as an attachment via email. Please submit your source code in a (readable) textual format.

A report on a project task should be submitted as a single pdf-document. On the top of the first page include: you name and matriculation number, date of submission and task number. The report should clearly indicate your reasoning process and illustrate the functionality of your program (e.g., you may represent appropriate images). If appropriate, it should include details of the underlying model, information on the (pre-)processing the data, the training procedure, the testing procedure and the evaluation results. You may additionally include any other aspect of your work that you find relevant.

5 Avoiding Plagiarism

You must cite all the sources that you have used in your project (including text, source codes, images, figures, etc). If you have any questions regarding plagiarism or academic misconduct then please contact me (preferably before you turn in your report).

6 Submission

- For each project task you should submit your (i) source code and (ii) report.
- Submissions should be sent to milangnjatovic@yahoo.com.
- The submission deadlines will be announced in a timely manner in lectures and at http://gnjatovic.info/imageprocessing/. If you cannot submit your assignment in time please contact me as soon as possible.